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ABSTRACT

This bibliography provides information about publications and presentations by the Human Resources Research Organization (HumRRO) during FY 1970. It can be used in conjunction with the cumulative "Bibliography of Publications as of 30 June 1969," which lists research reports issued since HumRRO's establishment in 1951. The HumRRO-published research reports issued during FY 1970 are listed, as are publications by staff members in professional journals and presentations at professional and military meetings. Contracts under which research efforts have been performed are identified. Abstracts have been provided for most items, which are listed under the code name of the research contract or of the Department of the Army Work Unit to which they relate. Code names for the research programs are listed alphabetically. If applicable, the listings include identification of the HumRRO Division at which research was performed. An appendix listing FY 70 Technical Reports and Professional Papers by number and an author index appendix are included. (CK)

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Bibliography of Publications and Presentations During FY 1970

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HUMAN RESOURCES RESEARCH ORGANIZATION

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Bibliography of Publications and Presentations During FY 1970

HUMAN RESOURCES RESEARCH ORGANIZATION

Requests for information concerning items in the Bibliography or other aspects of HumRRO work should be addressed to the Office of the President or to the Director of a research Division. The addresses are listed below.

President, Human Resources Research Organization, 300 North Washington Street, Alexandria, Va. 22314

Director, HumRRO Division No. 1 (System Operations), 300 North Washington Street, Alexandria, Va. 22314

Director, HumRRO Division No. 2, Fort Knox, Ky. 40121

Director, HumRRO Division No. 3, Post Office Box 5787, Presidio of Monterey, Calif. 93940

Director, HumRRO Division No. 4, Post Office Box 2086, Fort Benning, Ga. 31905

Director, HumRRO Division No. 5, Post Office Box 6057, Fort Bliss, Tex. 79916

Director, HumRRO Division No. 6 (Aviation), Post Office Box 428, Fort Rucker, Ala. 36360

Director, HumRRO Division No. 7 (Social Science), 300 North Washington Street, Alexandria, Va. 22314

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FOREWORD

The Human Resources Research Organization is a nonprofit research and development corporation whose purpose is "to improve human performance, particularly in organizational settings, through behavioral and social science research, development, and consultation."

Toward this objective, HumRRO has done research and development work on a wide range of special training and innovations in training technology. Our work is done under contracts with various departments of the Federal Government, with state or local governments, or with organizations that are involved in education or training responsibilities. HumRRO was established in 1951, under The George Washington University, to carry out an integrated program of human resources research for the Department of the Army. Research was later undertaken for other agencies, and in 1969 HumRRO separated from the University.

The chief product of HumRRO work is information; thus, reporting the results of these research efforts is a major endeavor. To this end, this *Bibliography of Publications and Presentations During FY 1970* has been compiled. It follows the *Bibliography of Publications As of 30 June 1969*, which is a complete accumulation of information about HumRRO research reporting up to that time.

Meredith P. Crawford
President
Human Resources Research Organization

DESCRIPTION OF THE BIBLIOGRAPHY

Purpose

This FY 1970 Bibliography provides information about publications and presentations by the Human Resources Research Organization during FY 1970. It can be used in conjunction with the cumulative *Bibliography of Publications As of 30 June 1969*, which lists research reports issued since HumRRO's establishment in 1951.

Scope

HumRRO-published researoh reports issued during FY 1970 are listed. In addition, the list includes publications by staff members in professional journals and presentations at professional and military meetings. Contracts under which research efforts have been performed are identified.

Abstracts have been provided for most items. Information supplied includes AD numbers, indicating items available to qualified users through the Defense Documentation Center (DDC). Most of the items are also available through the National Technical Information Service, U.S. Department of Commerce.

Organization

Items are listed under the code name of the research contract or of the Department of the Army Work Unit to which they relate. There are separate sections for Army research efforts other than Work Units—Basic Research, or Technical Advisory Service. There is also a General section, which lists items not directly related to a specific research project or related to several efforts.

Code names for the research programs are listed alphabetically; in each code word group, items are listed chronologically. Current research (as of 30 June 1970, the closing date of the Bibliography) is indicated by the word "ongoing" after the code name. Within their sections Basic Research efforts are listed sequentially by number, Technical Advisory Service and General publications by date.

If applicable, the listings include identification of the HumRRO Division at which research was performed.

An appendix listing FY 70 Technical Reports and Professional Papers by number, and an author index appendix are included.

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Human Resources Research Organization

Bibliography of Publications and Presentations During FY 1970

WORK UNITS AND RESEARCH PROJECTS

AAA–Division No. 3

Factors Affecting Efficiency and Morale In Antiaircraft Artillery Batteries
(Research for the Department of the Army)

Collected Papers Prepared Under Work Unit AAA: Factors Affecting Efficiency and Morale in Antiaircraft Artillery Batteries, Professional Paper 33-69, 41 pp., November 1969. AD-699 490

Research conducted in 1954-55 to determine the contribution of certain human factors to the effective performance of crew members of antiaircraft artillery batteries is described in this series of papers. The collection includes two presentations at professional meetings, two professional journal articles, and a task paper summarizing the research program.

APSTRAT–Division No. 3 **(Ongoing)**

Training Strategies Appropriate to Different Aptitude Levels for Selected Training Courses
(Research for the Department of the Army)

"Functional Context Training in an Operational System," by Kenneth Weingarten, Jacklyn Hungerland, Mark Brennan, Brent Allred, and Martin Pollyea, briefing for Department of Defense Manpower Research Planning Group, Washington, October 1969; issued as Professional Paper 8-70, 12 pp., March 1970. AD-706 337

This paper describes the work plan for the development of a complete training model suitable for multi-aptitude training populations and stressing individualized, self-paced learning in an operational functional context. Progress through the curriculum is determined by proficiency in task performance. The training model generates novel management problems and provides techniques for their solution.

AVTRAIN—Division No. 6 (Aviation)

A Study of U.S. Coast Guard Aviator Training and Training Device Requirements
(Research for the U.S. Coast Guard)

A Study of U.S. Coast Guard Aviator Training Requirements, Technical Report 69-102, by Eugene R. Hall, Paul W. Caro, Jr., and Oran B. Jolley, HumRRO Division No. 6 (Aviation) and Commander Gilbert E. Brown, Jr., United States Coast Guard, 89 pp., December 1969. AD-707 677

This report is concerned with relevant training methods for Coast Guard aviation. To meet this objective, a comprehensive study of aviator requirements during search and rescue missions was chosen for analysis in each of the four aircraft used by the Coast Guard. Interview data were used as the basis for a description of aviator performance and for a tabular listing of specific tasks involved. The report shows desirable functional characteristics for synthetic devices and provides a basis for subsequent development of specific operationally oriented training programs.

Design and Procurement Bases for Coast Guard Aircraft Simulators, Technical Report 69-103, by Paul W. Caro and Eugene R. Hall, HumRRO Division No. 6 (Aviation) and Commander Gilbert E. Brown, Jr., United States Coast Guard, 56 pp., December 1969. AD-708 209

In this exploratory study of the potential role of flight training devices in Coast Guard aviation training programs, the characteristics of the required synthetic training equipment, and development of plans for its funding and procurement are discussed. The magnitude of the synthetic flight training requirement and the cost-effectiveness benefits to be realized from use of such equipment are also examined. It is concluded that substantial training cost savings can be realized as a consequence of Variable Cockpit Training System (VCTS) utilization.

CIVIC—Division No. 7 (Social Science)

Guidelines for Civic Action Advisors
(Research for the Department of the Army)

Planned Change in Agrarian Countries, Technical Report 69-21, by Arthur H. Niehoff, 152 pp., December 1969 (CIVIC II). AD-701 167

The report is concerned with guidelines for relevant development projects in agrarian countries. Case studies of past projects, which were used for analysis, show that factors of special importance to success in development projects are: cooperation of local leaders; degree and immediacy of practical benefits; innovator skill in communication processes; and participation of recipients in implementing the change, and in maintaining the innovations.

COMSERVE—Division No. 7 (Social Science)

Development of a Manual for Community Service Volunteers
(Research for the Department of the Army)

Handbook on Volunteers in Army Community Service, by Stanley Levin, Noel T. Parisien, and Daniel Thursz, 126 pp., October 1969. (Subcontractor: Center for the Study of Voluntarism, School of Social Work, University of Maryland). AD-701 463

This handbook offers comprehensive information on developing and administering a volunteer program for Army Community Service (ACS). The handbook stresses the encouragement of innovation, flexibility, and individual initiative both in personnel and in programs. Since ACS Centers differ in many ways, the handbook discusses general guidelines and suggestions rather than detailed specifications in order that the information can be adapted and interpreted according to local circumstances. Among the topics covered are recruiting volunteers, interviewing, preparing job descriptions and facilities, supervision, and training design.

CONTROL—Division No. 4

Control in Small Infantry Units
(Research for the Department of the Army)

Squad Performance as a Function of the Distribution of a Squad Radio, Technical Report 69-24, by James W. Dees, 48 pp., December 1969. AD-701 152

To determine the optimum radio distribution within the infantry squad, a three-phase squad tactical problem was conducted to test seven distributions of the radio and a no-radio control condition. Measures included times required to accomplish specific actions, and the rated effectiveness of the squad in accomplishing its assigned tasks. The radio provided a significant advantage under simulated enemy fire and/or limited visibility. The optimal radio distribution was two-way communication between platoon leader and squad leader. Additional receivers below the level of the squad leader neither helped nor hindered proficiency, but additional transmitters below this level deteriorated overall performance. The data on proficiency ratings were generally not significant.

COPE—Division No. 7 (Social Science) **(Ongoing)**

Development of a Method for Training Military Personnel for Interaction With Foreign Nationals
(Research for the Department of the Army)

"The Development of Cultural Self-Awareness: Design of a Program of Instruction," by Alfred J. Kraemer, paper for NATO Conference, Brussels, Belgium, July 1969; issued as Professional Paper 27-69, 12 pp., August 1969. AD-694 505

In this paper the design of a training process for developing cultural self-awareness is described. Spontaneous interactions of Americans with foreigners in simulated on-the-job encounters are video-taped. Different behavioral manifestations of particular cognitions and their relation to American cultural premises and values are shown in sequences of video-taped excerpts used for training. The training is intended to enhance the effectiveness of U.S. personnel in overseas assignments.

DRIVER EDUCATION—Division No. 1 (System Operations)

Development of Driver Education Objectives: A Driving Task Analysis
(Research for the Department of Transportation)

"Image Generation for Driving Simulators: Analysis of the Driving Task," by A. James McKnight, paper for Third Annual Human Factors Workshop in Highway Transportation, Washington, January 1970.

Description of the analysis of the driving task for the Department of Transportation. This task is to identify driving behaviors leading to the development of instructional objectives for driver education courses based on study of the driving system.

ECHO—Division No. 6 (Aviation)

Synthetic Flight Training Programs and Devices
(Research for the Department of the Army)

"Use of Time-Lapse Photography in Flight Performance Evaluation," by Robert N. Isley and Paul W. Caro, Jr., *Journal of Applied Psychology*, vol. 54, no. 1, February 1970; issued as Professional Paper 10-70, 7 pp., April 1970 (ECHO III). AD-716 726

A time-lapse photographic technique for recording and scoring the inflight performance of helicopter aviator trainees during a hypothetical tactical instrument mission is described. Data were derived from 16-mm films of the instrument panel readings of the TH-13T helicopter. Advantages, disadvantages, and other possible applications of the film technique are also discussed.

A Determination of Selected Costs of Flight and Synthetic Flight Training, Technical Report 70-6, by Oran B. Jolley and Paul W. Caro, Jr., 42 pp., April 1970 (ECHO III). AD-706 764

This report is concerned with identifying and computing costs associated with the conduct of flight and synthetic training in the instrument phase of the Army's Officer/Warrant Officer Rotary Wing Aviator Course. The report describes the sources for and the treatment of data, and the major assumptions made in allocating the costs. Other applications of the information are discussed.

Equipment-Device Task Commonality Analysis and Transfer of Training, Technical Report 70-7, by Paul W. Caro, 34 pp., June 1970 (ECHO IV). AD-709 534

This is a report on procedures developed to determine the potential uses of training devices for missions in operational equipment. The procedures are designed in connection with an Army rotary wing instrument flight training program.

ENDURE–Division No. 2 **(Ongoing)**

Tank Crew Performance During Periods of Extended Combat
(Research for the Department of the Army)

"HumRRO Studies in Continuous Operations," by Donald F. Haggard, paper for 15th Annual Army Human Factors Research and Development Conference, Fort Ord, Calif., November 1969; issued as Professional Paper 7-70, 13 pp., March 1970. AD-705 705

A laboratory study and a field study were conducted to obtain data on performance decrements on tank crew tasks during 48 hours of continuous combat operations, and to examine the degree of decrement in terms of its effect on tactical efficiency. Experience in the studies illustrates the need for increased efficiency in obtaining human factors information, demanded by the increasing complexity of military tactics and equipment.

FORGE–Division No. 4 **(Ongoing)**

Factors in Military Organizational Effectiveness
(Research for the Department of the Army)

"Requirements for Organizational Leadership," by Joseph A. Olmstead, paper for conference at U.S. Military Academy, West Point, June 1969; issued as Professional Paper 26-69, 12 pp., August 1969. AD-693 010

The requirements for leadership of complex organizations, present and future, are described. The changing performance demanded of military organizations, and the implications for developing leaders who will have the necessary capabilities are discussed. Since the performances required of military organizations are becoming more adaptive, the distinctive quality of future leadership will lie in ability to develop and guide responsive systems of decision and action. Developing of future leaders will require recognizing the organizational role of leadership and designing training programs specifically attuned to that role.

HAWKEYE–Division No. 5

Methods for Improving Performance of Radar Technicians
(Research for the Department of the Army)

Development of a Procedure-Oriented Training Program for HAWK Radar Mechanics, Technical Report 69-25, 111 pp., December 1969 (HAWKEYE I). AD-703 315

In recent years the Army has experienced unacceptably high student failure rates in its electronics training programs. An experimental program was developed for training HAWK Continuous Wave Radar Mechanics, emphasizing the learning of specific sets of procedures for radar troubleshooting. Three classes were given the experimental training over a two-year period, and were compared with contemporary conventionally trained classes. In each comparison, the experimental program's attrition levels were as low as or lower than conventional classes, and end-of-course performance was equal to or slightly superior to that of conventionally trained graduates.

IMPACT—Division No. 1 (System Operations) **(Ongoing)**

Prototypes of Computerized Training for Army Personnel

(Research for the Department of the Army, The National Science Foundation, and the James McKeen Cattell Fund)

"Product or Systems Research as Applied to Education for Business," by Felix F. Kopstein, paper for meeting of Research Institute, National Business Education Association, St. Louis, Mo., October 1968; *National Business Education Quarterly*, vol. 37, no. 3, Spring 1969; issued as Professional Paper 30-69, 23 pp., October 1969. AD-697 541

This paper gives a brief summary of the conceptual structure of systems and their ramifications which includes surveys of three instructional models—the traditionally administered instruction, (TAI), programmed instruction (PI), and computer-administered instruction (CAI). Three brief articles of comment have also been reprinted with the original paper.

"Graph Theory as a Metalanguage of Communicable Knowledge," by Edward Kingsley, Felix F. Kopstein, and Robert J. Seidel, paper for annual meeting of the Society for General Systems Research, Dallas, Tex., December 1968, issued as Professional Paper 26-69, 24 pp., September 1969. AD-695 808

The attempts to devise and develop complete computer-administered instruction (CAI) systems have shown the need for an objective, rigorous, and subject-matter independent means for describing the organization of instructional content. Similar approaches to the problem, adopted independently in the U.S. and in France, involve the establishment of a set of subject-matter terms, concepts, topics, or other "units," and the subsequent defining of 1 to N relations on this set. The relations to be defined can reflect (a) inherent structure of the subject matter, (b) pedagogical strategy, (c) successful instructional communication, i.e., the student's current repertoire of subject matter and its structure. It is proposed to represent the set of concepts and relations as graphs or nets, a metalanguage whose mathematical properties are quite well-known. Graph descriptions of instructional subject matter furnish a map so that an instructional agent, human or computer, can orient the presentation.

"The Computer as Adaptive Instructional Decision Maker," by Felix F. Kopstein and Robert J. Seidel, paper for International Symposium on Man-Machine Systems, Cambridge, England, September 1969; issued as Professional Paper 1-70, 14 pp., January 1970. AD-703 597

This is a report on the computer's job for education and for instruction. It is maintained that the computer hardware and software alone cannot accomplish educational miracles, but is contingent on the development of a class of instructional decision models that interact with the student. To serve these purposes, the man-computer-man-communication channel must be of adequate capacity and relatively free of constraining filters. Issues are discussed in the context of an ongoing CAI systems development project.

"Rational vs. Empirical Approaches to Job/Task Descriptions for COBOL Programmers," by Felix F. Kopstein, paper for The Special Interest Group Computer Personnel Research of the Association for Computing Machinery annual conference, University of Chicago, June 1969; issued as Professional Paper 18-70, 11 pp., June 1970. AD-713 716

Empirical approaches deriving from job analysis and *rational* approaches deriving from task/equipment analysis are contrasted, to suggest the differences in the

information to be gained from each. Job analysis establishes what exactly a sample of incumbents do on the job. Task/equipment analysis deduces the behavioral requirements for its operators and maintainers from the functional characteristics of equipment, or from task situations that do not yet actually exist. The purely empirical approach develops a set of behavioral capabilities together with associated frequencies of occurrence, but cannot guarantee that the required set of behavioral capabilities will be exhaustively enumerated. The purely rational approach will develop an exhaustive set of behavioral capabilities requisite for certain job or task constellations, but will provide no good way of establishing their probabilities of occurrence. A combined approach, therefore, seems desirable, and is illustrated in the context of a COBOL programmer's job. The use of data from combined rational and empirical job/task analyses for statistical models of job families is discussed, as is the use of these models in training design.

"Technology of Training: Project IMPACT," by J.D. Lyons, paper for CONARC briefing, Fort Monroe, Va., February 1970; included in *HumRRO Research in Training Technology*, Professional Paper 21-70, 39 pp., June 1970. AD-712 285

This paper is one of four presentations on research and development in educational technology by members of the HumRRO staff at a briefing sponsored by the Office of the Deputy Chief of Staff for Individual Training at Headquarters, U.S. Continental Army Command in February 1970. This presentation describes research under Work Unit IMPACT, Prototypes of Computerized Training for Army Personnel.

"Resource Allocations to Effect Operationally Useful CAI," by Robert J. Seidel and Felix F. Kopstein, paper for National Security Industrial Association (NSIA) conference, Washington, February 1970; issued as Professional Paper 12-70, 19 pp., April 1970. AD-706 839

Resource allocations, in terms of funds, people, facilities, and the delegation of appropriate authority to formulate appropriate policy for research and development and implementation of computer-assisted instruction are discussed in this paper. A description and justification of CAI as a technology is included. The need for incorporating a systems approach to educational innovation is stressed. A partnership among industry (profit and nonprofit), government, and education is suggested as a model, and a national network of multidisciplinary centers is advocated as the vehicle for accomplishing the goals of research, development, and implementation of effective and efficient CAI systems.

"Psychology or Cybernetics as Basis for Instructional Strategy," by Felix F. Kopstein and Robert J. Seidel, paper for The American Educational Research Association, Minneapolis, Minn., March 1970.

In this paper, it is found that experience with programmed instruction leaves some doubt that effective and efficient instructional strategies can be derived solely from behavioral psychology. An alternative for meaningful instructional strategies—cybernetics—was found to have much to recommend it. The principles of iterative feedback control and regulation in the instructional process are discussed, and the use of these principles in recent instructional theories is illustrated.

"CAI: Technological Misconceptions," letter by Robert J. Seidel, Felix F. Kopstein, and Ronald J. Swallow, *Science*, vol. 168, no. 3938, June 1970.

INGROUP—Division No. 4 **(Ongoing)**

Small-Group Instructional Methods for Military Training
(Research for the Department of the Army)

Theory and State of the Art of Small-Group Methods of Instruction, Technical Report 70-3, by Joseph A. Olmstead, 51 pp., March 1970. AD-703 377

In this report, the more common small-group methods are evaluated in terms of their effectiveness for teaching adults. A rationale for small-group instruction is presented, followed by descriptions of the principal methods, and an evaluation of the techniques based on existing research findings. It is concluded that small-group methods can be effective for enhancing motivation for learning, developing positive attitudes toward later use of course materials, and improving problem-solving skills. But they are no more effective than lectures for transmitting information and concepts, although—when used in conjunction with lectures—the methods are helpful for increasing depth of understanding of course content. Implications for use of small-group methods, including requirements for instructors, are discussed.

INTACT—Division No. 6 (Aviation)[1]

Integrated Contact/Instrument Training
(Research for the Department of the Army)

Evaluation of the Integrated Contact-Instrument Concept for Army Fixed Wing Flight Instruction, Technical Report 69-26, by Wallace W. Prophet and Oran B. Jolley, 108 pp., December 1969 (INTACT I). AD-703 161

This report describes the results of an experimental comparison of three primary fixed wing flight training methods. Three groups of students from two Army primary fixed wing flight classes were given one of the three methods of instruction. Their flight performances in primary, advanced contact and advanced instrument training phases were compared, using specially developed objective flight performance measures, and results were given.

JOBTEST—Division No. 2

Proficiency Measurement Techniques
(Research for the Department of the Army)

"An Approach to Standardizing Human Performance Assessment," by John D. Engel, paper for THEMIS conference, Texas Technological University, Lubbock, Tex., March 1970.

The standardization and evaluation of methods of performance assessment represents an important area of concern. In this paper an approach that concentrates on two critical areas and the relationship between them is discussed. These are: (a) A task classification system, and (b) a performance measure classification system. An example is presented that illustrates some preliminary research related to the use of a performance measure classification system. The paper concludes by suggesting areas and directions for future research efforts.

[1] This Work Unit was initiated at Division No. 1 (System Operations)

LEAD—Division No. 4

Development of Training for Improving the Combat Skills of Leaders in Small Infantry Units
(Research for the Department of the Army)

Critical Combat Performances, Knowledges, and Skills Required of the Infantry Rifle Platoon Leader: Code of Conduct, Evasion, and Escape, Research By-Product by Frank L. Brown, July 1969 (LEAD I). AD-704 969

This document is one of a series of research by-products that details the critical skills, knowledges, and performances the infantry rifle platoon leader must possess for effective individual and unit combat performance. The overall goal of the research is to improve officer training in these critical combat skill areas necessary for effective leadership. This document concerns the critical skill requirements in the area of code of conduct, evasion, and escape.

Developing the Critical Combat Performance Required of the Infantry Rifle Platoon Leader, Technical Report 70-5, by Frank L. Brown and T.O. Jacobs, 92 pp., April 1970 (LEAD I). AD-704 946

This paper describes the methods employed in Work Unit LEAD to identify and record the critical combat performances, knowledges, and skills required of the Infantry Rifle Platoon Leader. From over 200 small-unit combat actions ranging from World War II to Vietnam, some 6,000 performances, knowledges, and skills were extracted, categorized into major subject areas, and finally recorded in 41 research by-products. The general methodology developed by this research may be applicable to the identification of the combat requirements of other military command or staff functions. The practice by major unit commanders of requiring unit historians to record detailed descriptions of small-unit combat actions will provide useful sources of data for other performance, knowledge, or skill research.

LEADREVIEW—Division No. 4

The Development of a Comprehensive Review of Psychological and Sociological Literature on Organizational Leadership
(Research for the Office of Naval Research)

Annual Summary Report, Project: Leadership Training, by T.O. Jacobs, 16 pp., June 1970. AD-708 408

The objective of the present project is to develop a review and integration of the current social psychological and sociological literature relevant to leadership in formal organizations. The work during the first year of the project has consisted of abstracting and cataloging approximately 900 references; the projected outline for the review is presented as an appendix to the report.

LOWENTRY—Division No. 6 (Aviation)
Methods for Improving Navigation Training for Low-Level Flight
(Research for the Department of the Army)

"Orientation Systems: First Things First," by Robert H. Wright, paper for JANAIR, Joint Army-Navy Aircraft Instrumentation Research Symposium, Washington, November 1969; issued as Professional Paper 3-70, 10 pp., February 1970. AD-705 021

The geographic orientation requirement for the Army's lighter aircraft, and for Army aviation as a system, is a system-analysis and system-design problem that appears to have defied solution. The factors considered in this paper indicate that the requirement is not filled by a simple "more sophisticated machine" systems approach. Instead, the *man* part of the man-machine system needs to be deliberately "designed in" to contribute his full potential as a functional part of the system. Also, the Army aviation operational environment, with all of its complex interacting coordination requirements, needs to be considered, for an affordable and operationally effective geographic orientation system.

MAP—Division No. 7 (Social Science)
Development of Guidelines for Training Personnel for Military Assistance Advisory Duties
(Research for the Department of the Army)

Military Advisors and Counterparts in Korea: 1. Job Characteristics, Technical Report 69-15, by Dean K. Froehlich, 87 pp., August 1969 (For Official Use Only) (MAP II). AD-860 235

U.S. Army personnel assigned to the Korea Military Assistance Group and functioning as advisors to counterparts in the Republic of Korea were surveyed by means of a questionnaire. Information was collected on the objectives advisors sought, the obstacles they encountered, the amounts of time required to accomplish changes, the nature of counterparts' participation in the work, and features of the advisor role judged important. Results of the survey provide a description of the advisor with respect to the information obtained and are used as a basis for identifying certain cardinal characteristics of the advisor role.

"The Military Advisor as Defined by Counterparts," by Dean K. Froehlich, paper for 15th Annual Army Human Factors Research and Development Conference, Fort Ord, Calif., November 1969; issued as Professional Paper 9-70, 9 pp., March 1970. AD-705 699

An attempt to define the characteristics of successful Military Assistance Program advisors has been made as part of a research effort which has the ultimate aim of applying scientific techniques to the selection, training, and management of advisors. Data describing the work of advisors have been collected from both advisors and their counterparts. This paper mainly discusses the characteristics and behaviors of the successful advisor as viewed by counterparts.

METHOD—Division No. 1 (System Operations)
Research for Programed Instruction in Military Training
(Research for the Department of the Army)

"The Application of Theoretical Factors in Teaching Problem-Solving by Programed Instruction," abbreviated version of Technical Report 68-4, April 1968, by Robert J. Seidel and Harold G. Hunter; in *International Review of Applied Psychology*, vol. 19, no. 1, April 1970 (METHOD II). AD-715 569

In continuing research into training technology, the aim was to devise guidelines for applying programed instruction to training that involves learning principles and rules for use in problem solving. A portion of the Army's ADPS Programing Specialist Course was programed to explore factors in using automated instruction to teach computer programming. Experimental versions of the course were administered to over 900 subjects in various experimental groupings. Criterion and retention tests based on actual job problems were used to measure subjects' performance, along with in-training measures.

NIGHTSIGHTS—Division No. 2
Training Techniques for New Night Vision Devices
(Research for the Department of the Army)

The Effects of Interruption of Dark Adaptation on Performance of Two Military Tasks at Night, Technical Report 69-20, by David L. Easley, Donald L. Wright, William N. Warnick, and William N. Gipe, 44 pp., December 1969 (NIGHTSIGHTS I). AD-699 489

To determine how interruption of dark adaptation (by using an intensifier) affected performance of military tasks with unaided vision at night, two series of studies were conducted. Interruption of dark adaptation with a simulated monocular intensifier in the shooting eye or both eyes just before the task was begun decreased the horizontal distance at which the guideline was followed. A readaptation interval of two to three minutes after interruption of dark adaptation by a binocular intensifier restored performance to the level under dark-adapted vision. Interruption of dark adaptation just before rifle firing lengthened time to first round and duration of fire, but did not lessen accuracy.

A Prototype Pictorial Guide for the Night Observation Device-Long Range, AN/TSS-7 Operator, Research By-Product by Richard Frank and John D. Engel, February 1970 (NIGHTSIGHTS IV). AD-813 869

This publication was developed as a training and/or performance aid, and contains the essential operator procedures for the Night Observation Device-Long Range, AN/TSS-7.

OVERDRIVE—Division No. 1 (System Operations)

Analysis of Training Requirements for Operation of an Amphibious Air Cushion Vehicle

(Research for the Department of the Army)

An Analysis of Skill Requirements for Operators of Amphibious Air Cushion Vehicles (ACVs), Technical Report 69-18, by A. James McKnight, Patrick J. Butler, and Richard D. Behringer, 56 pp., November 1969. AD-698 458

This report describes the skills required in the operation of an amphibious Air Cushion Vehicle (ACV) in Army tactical and logistic missions. The research involved: (a) An analysis of the ACV characteristics, operating requirements, and environment, and (b) results of a simulation experiment. The analysis indicates that ACV operation is complicated by (a) An inherently slow vehicle response in certain control dimensions, (b) a need for complex control coordinations in performing certain necessary maneuvers, and (c) the ACV's sensitivity to various aspects of the natural and man-made environment. The ACV also poses unique requirements for navigation, maintenance, and collision avoidance. The simulator study showed that ACVs vary considerably in operability as a function of their control configuration and pointed to the need for further attention to the control problem in developing ACV use overland.

PREDICT—Division No. 6 (Aviation) **(Ongoing)**

Correlational Analysis of Aviator Performance

(Research for the Department of the Army)

"Combat Aviator Criterion Development," by Wiley R. Boyles, Peter R. Prunkl, and James L. Wahlberg, paper for symposium at American Psychological Association convention, Washington, September 1969; issued as Professional Paper 34-69, 13 pp., November 1969. AD-703 510

Factors that must be considered in the development of criteria for proficient performance of a complex job are discussed in the context of the Army aviation combat situation. Ratings of aviators by peers, subordinates, and superiors on pertinent job behaviors have been collected following identification of the pertinent behaviors by the critical incident method. Moderator variable effects on the ratings are described, as are some alternative strategies for future research.

"Prediction of Army Aviator Performance: Description of a Developing System," by Wiley R. Boyles and James L. Wahlberg, paper for annual meeting of Alabama Psychological Association, Destin, Fla., May 1970.

A discussion of prediction tools developed to help supervisors make early decisions involving further training of Army aviators. The aim of the effort is to have all potentially useful predictors available early in the training of potential Army aviators.

"Peer Ratings as Predictors of Success in Military Aviation," by James L. Wahlberg, Wiley R. Boyles, and H. Alton Boyd, paper for annual meeting of Alabama Psychological Association, Destin, Fla., May 1970.

The purpose of this paper is to describe the construction of the three HumRRO peer ratings and to compare the validity of these forms with the Contemporary Evaluation Form used by the Primary Helicopter School.

REALISTIC—Division No. 3 **(Ongoing)**

Determination of Reading, Listening, and Arithmetic Skills Required for Major Military Occupational Specialties
(Research for the Department of the Army)

"Comprehension of Repeated Time-Compressed Recordings," by Thomas G. Sticht, *The Journal of Experimental Education*, vol. 37, no. 4, Summer 1969; issued as Professional Paper 2-70, 6 pp., January 1970. AD-704 370

Time-compressed, tape-recorded messages were used to determine whether listening to the message twice, in the same amount of time required to listen to the uncompressed message once, would improve listening comprehension scores of high and low aptitude men. The results indicated that for both groups of men, listening twice improved comprehension scores over scores obtained by listening once. Comprehension of repeated time-compressed messages was not improved over that obtained by a single listening to the uncompressed messages.

"Studies on the Efficiency of Learning by Listening to Time-Compressed Speech," by Thomas G. Sticht, paper for Second Louisville Conference on Rate and/or Frequency Controlled Speech, University of Louisville, October 1969; issued as Professional Paper 4-70, 12 pp., February 1970. AD-705 022

Two experiments were performed to determine whether using the time saved by the time-compression process to repeat or extend information presented by audio tapes would increase the amount learned by listening to rapid speech. Neither repeating nor extending information improved learning over that obtained by listening to uncompressed information for an equal amount of time. This was true for high and low mental aptitude subjects. The implication that more information can be learned in a unit of time with moderate compression remains to be substantiated.

"Determining Literacy Requirements of Jobs: Progress and Prospects for Project REALISTIC," by Thomas G. Sticht, Richard P. Kern, John S. Caylor, and Lynn C. Fox, briefing for DoD Manpower Research Planning Group, Washington, October 1969; issued as Professional Paper 13-70, 13 pp., May 1970. AD-708 696

Project REALISTIC is concerned with identifying REAding, LIStening, and ArithmeTIC skills adequate for performing successfully in several military occupational specialties. This paper reports progress on this research and projects future activities. Summarized are data on the relationships of reading and listening test scores to job performance, the reading difficulty levels of job-related printed materials, and the extent of usage of reading and listening information sources by men of low, medium, and high reading ability.

"Readability, Reading Ability, and Readership," by Richard P. Kern, Thomas G. Sticht, and Lynn C. Fox, paper for 15th Annual Army Human Factors Research and Development Conference, Fort Ord, Calif., November 1969; issued as Professional Paper 17-70, 13 pp., June 1970. AD-709 629

This paper presents data describing large discrepancies between the reading difficulty levels of printed materials used in certain MOSs and the relatively lower reading ability levels of men assigned to these MOSs. There are some initial data exploring the relationship between reading ability and utilization of printed materials on the job. It is suggested that the low level of on-the-job utilization of printed materials found in the data is probably related to the difficulty of the reading tasks these materials require of the reader. Finally, an approach for identifying on-the-job reading tasks and studying their reading skill requirements is outlined.

Learning by Listening in Relation to Aptitude, Reading, and Rate-Controlled Speech, Technical Report 69-23, by Thomas G. Sticht, 46 pp., December 1969. AD-701 150

A series of studies was performed to explore the possibility of substituting listening for reading requirements, with special reference to marginally literate Category IV personnel. Time-compressed speech was evaluated as a means of producing listening rates comparable to silent reading rates. The results indicated that for both average and low aptitude men, listening was as effective as reading for obtaining factual information from test passages varying in difficulty level. Both high and low aptitude men learned more efficiently with moderate (36%) amounts of time compression than with no compression of the listening selections. Additional evaluations of time-compressed speech were made, and education and training implications of the research were discussed.

SKYFIRE—Division No. 5 **(Ongoing)**

Training Methods for Forward Area Air Defense Weapons
(Research for the Department of the Army)

Determination of Ground-to-Aircraft Distances by Visual Techniques, Technical Report 69-22, by Robert J. Foskett, 42 pp., December 1969. AD-701 151

As part of research to develop techniques for use in the training of range estimation, the accuracies of two visual methods of determining specific ground-to-aircraft distances were compared. Using the Flyover method, training assistants signaled when the aircraft flew over markers placed at known distances from the training site. Using the Range Sight method, training assistants used a ranging device similar to a protractor to indicate when an aircraft passed each of several reference markers corresponding to known distances and angles from the training site. Comparison of the accuracy of each visual method with radar measurement of the aircraft positions indicated that, in general, the Flyover method was more accurate than the Range Sight method. However, the Range Sight method was of acceptable accuracy under certain conditions and was more economical, since fewer persons were required to determine the measurements. Data were also obtained concerning the navigational accuracy of the aircraft flying at various speeds and altitudes over ground courses marked intermittently or continuously.

Methods of Training for the Engagement of Aircraft With Small Arms, Technical Report 70-2, by E.W. Frederickson, Robert D. Baldwin, and Robert J. Foskett, 54 pp., February 1970. AD-703 507

Studies were performed to develop low-cost techniques for training infantrymen to engage low-flying aircraft with small arms. The first approach included training on estimating distance, leading, and tracking, using a special training device. After training, in live firing using a sleeve target towed at low altitudes, 16 riflemen obtained 10 hits for 960 rounds fired. Adjusting for the small size of the sleeve, it was estimated that 4% of the rounds would have hit a full-size aircraft. In the second approach, a miniaturized program used air rifles against 1/10-scale aircraft silhouettes. This training was also evaluated by a live-firing test. The 20 men who received the training achieved 13 hits for 1964 rounds fired; another group of 20 untrained riflemen obtained 4 hits for 2000 rounds. Adjusting for reduced target size, it was estimated that the hit percentages would be 2.3% and 0.7%, respectively. It was concluded that while both approaches to training were effective, the miniaturized program could be improved by incorporating the leading/tracking training device used in the initial method.

Auditory and Visual Tracking of a Moving Target, Technical Report 70-4, by Edward W. Frederickson and Robert A. Donohue, 23 pp., March 1970. AD-704 701

A test of target tracking accuracy was conducted, comparing individual performances of auditory and visual tracking. Aiming and pointing responses were compared for both tracking modalities and for approaching vs. departing target aspects. Comparison of mean auditory tracking location errors corrected (for acoustic lag) with mean visual tracking location errors showed that the mean auditory location errors increased as the target-to-observer distance increased, whereas mean visual location errors remained constant. When both constant and variable errors were combined into a measure of total human error, the Dispersion Index, total auditory tracking error was found to be greater than total visual tracking error across all treatment conditions. There were no significant differences found between mean aiming vs. pointing performances. Direction (incoming vs. outgoing and left-to-right vs. right-to-left) also did not influence tracking accuracy.

SOJOURN—Division No. 7 (Social Science)
Overseas Military Posts and Communities
(Research for the Department of the Army)

Toward the Study of Communities of Americans Overseas, by Harley M. Upchurch, Professional Paper 14-70, 22 pp., May 1970. AD-708 779

Increased United States involvement in world affairs has been accompanied by an increase in the number of Americans living abroad in numerous American enclaves. Most of the commentary on such "overseas American communities" is impressionistic, superficial, and stereotyped, and tends to foster the notion that Americans are peculiarly ethnocentric. Such an assumption ignores the fact that whenever a fairly large number of persons from one country reside abroad, they tend to cluster into enclaves that provide havens from "culture shock." It is suggested that systematic, objective, and empirical descriptions of such communities could make a valuable contribution to the study of migration, acculturation, and communities in general. To that end, a frame of reference derived from past studies is proposed, both as a generic concept and a subcultural category. Data would be generated that would permit an analysis of the relationship between community characteristics and cross-cultural interaction and attitudes.

SPECTRUM—Division No. 3 **(Ongoing)**
Development of Effective Training Across All Aptitude Levels
(Research for the Department of the Army)

"Aptitude Level and Performance in Simple and Choice Visual Monitoring Tasks," by Wayne L. Fox, paper for meeting of Psychonomic Society, St. Louis, Mo., October 1968; *Journal of Experimental Psychology*, vol. 81, no. 1, July 1969; issued as Professional Paper 28-69, 6 pp., September 1969. AD-696 032

The performance of 77 high- and 80 low-aptitude subjects on simple and choice visual monitoring tasks was studied under conditions designed to assess the effect of attention on response time. A Non-Alerted condition (blank stimulus display) and on Alerted condition (warning signal preceding the stimulus) were compared to a Blinking Light condition of a previous study, where the subject was confronted with a "blinking lights" stimulus display and relatively long interstimulus intervals. Results indicated highly consistent aptitude differences on both tasks.

A Review of Combat Support Training, Technical Report 69-19, by Ernest K. Montague and Morris Showel, 32 pp., December 1969 (SPECTRUM I). AD-703 196

Combat support training was observed at four Army training centers, with particular reference to training objectives, methods, and student evaluation, especially as these relate to increasing individualization of training. Training problems most relevant to individualization were in the areas of highly verbally-oriented objectives, a high degree of verbal instruction, and a high degree of use of written examination for evaluation of student performance. The addition of large numbers of soldiers of low academic ability has intensified these problems and has added new questions of appropriate training methods for the simultaneous training of students of a wide range of ability.

"Factors Related to Individual Training," by John E. Taylor, paper for 15th Annual Army Human Factors Research and Development Conference, Fort Ord, Calif., November 1969; issued as Professional Paper 11-70, 8 pp., April 1970. AD-706 338

In this paper a resume of the findings of ongoing research on the design of strategies for conducting individual training is presented. Studies being conducted, both in laboratory and operational training settings, assess the impact of individual difference, task, and training method variables on the design of training strategies. The findings are seen to bear directly on the Army's requirements for designing efficient instruction for a training population that now includes large numbers of trainees in all mental categories of the AFQT.

SUPPORT—Division No. 3

Development of Improved Training for Combat Support Training

(Research for the Department of the Army)

Development and Evaluation of an Integrated Basic Combat/Advanced Individual Training Program for Medical Corpsmen (MOS 91A10), Technical Report 70-1, by Joseph S. Ward, Nelson I. Fooks, Richard P. Kern, and Robert D. McDonald, 92 pp., January 1970 (SUPPORT II). AD-703 317

A study was conducted to determine the effect of integrating the Basic Combat Training (BCT) and Advanced Individual Training (AIT) of the Medical Corpsman (MOS 91A10) for Conscientious Objector personnel. It was expected that the study would serve as a test of the combined BCT/AIT concept of training for broader application in the Army training system. The curriculum for COs was redesigned to provide a continuous MOS-oriented 16-week training sequence; included were introduction of new training techniques, such as TV geared to the rate of learning, and arrangement of instructional material in functional context. Two sample classes ($N = 80$) each were trained with this redesigned curriculum, and tested against comparable classes trained in the normal two-stage sequence. In all subjects related to medical training, the experimental group performed significantly better on performance tests than trainees in the control group and did as well on written tests of military and medical knowledge.

Development and Evaluation of an Improved Radio Operator Course (MOS 05B20), Technical Report 70-8, by S. James Goffard, Donald F. Polden, and Joseph S. Ward, 38 pp., June 1970 (SUPPORT I). AD-710 865

This report describes the development and evaluation of an improved Radio Operator Course approved for use by the U.S. Army. Existing training was reorganized according to the principle of "Functional Context." The duties of a radio operator were examined to see how they could be arranged into specific tasks to be taught in sequence; since each successive task is embedded in a context of tasks that he has already learned to perform, the trainee learns to perform all of them with relative ease. The effectiveness of the revised course was determined by comparing 10 standard and 20 revised classes in 1967-68. The revised classes had substantially fewer trainees who had to be recycled (despite the fact that the classes were 40% larger and contained twice as many Category IV trainees). Also, the revised classes had substantially fewer trainees failing the course.

SYNTRAIN—Division No. 6 (Aviation) **(Ongoing)**

Modernization of Synthetic Training in Army Aviation
(Research for the Department of the Army)

"Adaptive Training—An Application to Flight Simulation," by Paul W. Caro, Jr., paper for New England Psychological Association, Boston, November 1968; *Human Factors*, vol. 11, no. 6, December 1969; issued as Professional Paper 5-70, 10 pp., March 1970. AD-705 013

Army pilot training requirements, particularly in the helicopter area, are growing rapidly. To meet the increased training load, an Army-wide system of aircraft simulators, known as the Synthetic Flight Training System (SFTS) has been designed and is under development. A feature of the SFTS is the automation of many instructor functions normally associated with training in the flight simulators. A portion of the automation involves the application of adaptive training techniques. This paper describes the SFTS and the rationale for the incorporation in it of adaptive training. The selection of appropriate adaptive variables, techniques for error measurement and for providing feedback to trainees, and the adaptive logic employed are discussed.

TRAINMAN—Division No. 2

Development of an Instructional Program in Training Technology and Training Management
(Research for the Department of the Army)

An Experimental Program of Instruction on the Management of Training, Technical Report 70-9, by Donald F. Haggard, Norman Willard, Jr., Robert A. Baker, William C. Osborn, and Shepard Schwartz, 346 pp., June 1970. AD-711 948

A course on management of training developed for presentation to Advanced Officer classes included construction based on job task statements, a systems engineering approach to training, and state-of-the-art technology; repeated presentation of course materials, and modification by training research personnel on the basis of student and instructor appraisals.

TUMOR REGISTRY SURVEY—Division No. 1 (System Operations)

Tumor Registry Survey

(Research for Louisiana Regional Medical Program)

Establishment of a Tumor Registry System for Louisiana: Proposals on Objectives, Capabilities, and Structure, Technical Report 70-101, by C. Dennis Fink, 41 pp., June 1970. AD-711 249

Tumor registry supervisors and secretaries, and hospital administrators at nine Louisiana hospitals and clinics were interviewed to obtain information to guide the design and development of a central tumor registry and state-wide registry system. Information was obtained on (a) local interest in the establishment of a state-wide registry system; (b) services which a central registry might provide; (c) manner in which existing local registries are utilized; and (d) conditions under which hospitals would be willing to join the central registry system. Six hospitals and one community registry were identified as candidates for incorporation into the initial registry system.

UTILITY—Division No. 3 **(Ongoing)**

Study of Men in Lower Mental Categories: Job Performance and the Identification of Potentially Successful and Potentially Unsuccessful Men

(Research for the Department of the Army)

"Progress Report on Work Unit UTILITY," by Robert Vineberg, Elaine Taylor, and John S. Caylor, briefings to U.S. Department of Defense, September and October 1969; issued as Professional Paper 6-70, 29 pp., March 1970. AD-705 730

This paper summarizes and illustrates some of the early findings of HumRRO research to determine how soldiers in Mental Category IV and in other mental categories on the Armed Forces Qualification Test compare in the performance of jobs. Tests are described and results shown with data gathered from five selected MOSs—Armor Crewman, General Vehicle Repairman, Unit and Organizational Supply Specialist, Cook, and Medical Corpsman.

BASIC RESEARCH STUDIES

Basic Research 8—Division No. 2
Common Job Elements
(Research for the Department of the Army)

"The Development of a Response Taxonomy," by Elmo E. Miller, paper for symposium at American Psychological Association meeting, Washington, September 1969; issued as Professional Paper 32-69, 8 pp., October 1969. AD-699 479

A taxonomy of response processes has been developed to facilitate the designing of training programs; each kind of task presumably would require a different set of training methods for greatest efficiency, so classifying a task would be part of determining which methods to use. A pool of response distinctions was collected, with special attention to those commonly made in training practice. A large number of training strategies were also collected and organized into a classification scheme. The two taxonomies were then systematically interrelated to further their development and application.

A Taxonomy of Response Processes, Technical Report 69-16, by Elmo E. Miller, 49 pp., September 1969. AD-695 499

A system for classifying perceptual-motor tasks was devised for the purpose of distinguishing the kinds of training strategy appropriate for each task. A rationale is presented and various task elements are delineated in terms of cue functions, image or mediational functions, and movement tendency. The defined task elements were used in constructing two classifications: one of training strategies, and one of tasks. The classification of training strategies deals with the operational conditions of practice and the diagnosis of the underlying behavioral process. The task classification has four main divisions: reactive—adjustive; reactive—selection from a set of responses; developmental—procedural; and developmental—skilled performance. Task subclasses have been distinguished. Finally, the kinds of training strategies are related to the classes of tasks, as preliminary investigation of how well the task classification accomplished its purpose.

Basic Research 16—Division No. 5 **(Ongoing)**
Improving Ability to See Military Targets
(Research for the Department of the Army)

"Shape Perception Judgments as a Function of Stimulus Orientation, Stimulus Background, and Perceptual Style," by Edward Wayne Frederickson, dissertation submitted to the faculty of Baylor University in partial fulfillment of the requirements for the degree of Doctor of Philosophy, August 1969.

The thesis deals with two experiments that were conducted to test the validity of the shape-slant invariance hypotheses. One test used a two-dimensional rectangular stimulus to obtain shape judgment responses; the second test used three-dimensional rectangular solids for shape and rotational orientation.

Basic Research 18—Division No. 2
Behavior Management
(Research for the Department of the Army)

Reinforcement Management: An Approach to Motivating Army Trainees, Technical Report 69-17, by Barrie Cassileth, 20 pp., November 1969. AD-701 149

To study the effectiveness of reinforcement management (contingency management) as applied to a military program of instruction already in operation, 335 students in an Army clerk-typist course in which self-paced instruction is employed were given points for successive approximations to desired learning behavior. The points were exchangeable later for varying lengths of time off. Only trainees of high initial typing skill were found to have been significantly affected by the experimental program. The selective impact of contingency management found in this population is examined in terms of present military conduct of self-paced instruction, and in terms of military management of motivation and training.

Basic Research 19—Division No. 4
Definition of Learning Variables
(Research for the Department of the Army)

"Intelligence Profile in the Prediction of Psychomotor Skills, Perseverance, and Leadership," by James W. Dees, *Experimental Publication System*, American Psychological Association, Issue 6, June 1970; issued as Professional Paper 22-70, 9 pp., June 1970. AD-714 534

Subjects from an Officer Candidate company were given 37 tests using the criteria of leadership (peer ratings), perseverance (completion or resignation from OCS Program), and psychomotor skill (M16 rifle proficiency test). An embedded figures test was administered as a measure of a personality variable. The data from these tests support a unified theory of human potential and should offer opportunities for prediction overlooked in the past.

TECHNICAL ADVISORY SERVICE

The Effects of Changes in Transition Firing Upon "Quick Kill" Proficiency, Technical Report 69-14, by Joseph A. Olmstead and T.O. Jacobs, 15 pp., July 1969. (Div. 4) AD-692 930

This study determined the effects of modifications in "Quick Kill" rifle training on the proficiency of trainees in Basic Combat Training in using Quick Kill techniques. It was concluded that (a) use of the temporary training rib on the rifle in Transition Firing produces superior results, (b) no significant loss in Quick Kill proficiency should result from reducing range and number of targets from three targets at 15, 30, and 50 meters to two targets at 20 and 50 meters, retaining the training rib, (c) reducing total number of rounds fired from 60 to 30 without a reduction in targets would result in reduced proficiency, and (d) three hours of Air Rifle practical exercises produce results superior to one and one-half hours of exercises.

GENERAL

Operational Context Training in Individual Technical Skills, papers for conference on operational context training, Washington, June 1958; issued as Professional Paper 35-69, 25 pp., December 1969. (Div. 1) AD-703 515

These three papers were written within the framework of the conference objectives: To assess the current status and explore the potentialities of on-site or operational context training; and, To generate guidance for research to support effective use of on-site or operational context training. The papers are: "Operational Context Training: Its Meaning and Potential," by Arthur J. Hoehn; "Operational Context Training for Nike Operators," by Myron Woolman; and "Training in an Operaitonal Context," by Robert Glaser.

"Human Factors in Airmobility," by Wallace W. Prophet, paper for Army Scientific Advisory Panel Spring meeting, Fort Rucker, Ala., May 1969; issued as Professional Paper 31-69, 16 pp., October 1969. (Div. 6) AD-697 081

In this paper the general organization of the Army Human Factors and Social Science Research Program and its principal research agencies, and current research activities of HumRRO Division No. 6 (Aviation) are described. These include studies of prediction of aviator performance, systems engineering of aviation maintenance training, human information processing functions in aerial reconnaissance and surveillance systems, and aviation simulation and training device requirements. Selected human factors research areas of significance to Army airmobility during the 1970-1980 period are also discussed. These are grouped under problems related to airmobile operational considerations, hardware considerations, and human learning considerations.

"Remarks on Systems Analysis for Social Problems," by Eugene A. Cogan, paper for Washington Operations Research Council symposium, Gaithersburg, Md., May 1969; issued as Professional Paper 15-70, 9 pp., May 1970. (Exec. Off.) AD-709 500

In this paper the need for more experience in *how* to adapt and apply the techniques of systems analysis to social and educational problems is stressed. Education and other social institutions, although very large activities, are managed as small independent units; therefore, adapting techniques from other applications and to form *general* decisions paradigms is mandatory. As for any systems analysis, it is necessary to begin with specific, carefully defined output objectives. For example, rather than subject matter approaches to educational curricula, output (desired resulting performance competence) should be used to identify input (instructional content). Use of system analysis techniques is essential to develop ways to solve social problems. For education, individualizing instruction to vastly improve the education process requires a systems analysis approach.

[1] Items in this section either are not directly related to specific elements of the research program, or are related to several elements.

Progress Report on HumRRO Research on Project 100,000. Professional Paper 25-69, by Howard H. McFann, 20 pp., July 1969; based on presentation at USCONARC 2nd Education and Training Conference, Fort Monroe, Va., February 1969. (Div. 3) AD-691 633

A progress report dealing with the technical advisory service activities of HumRRO, primarily covering content, training, learning ability, literacy requirements, and on-the-job performance.

"Faculty In-Service Training Programs and the Process of Educational Change," by Saul Lavisky, presentation at Workshop for In-Service Training Personnel, American Association of Junior Colleges, Warrenton, Va., July 1969; issued as Professional Paper 38-69, 16 pp., December 1969. (Exec. Off.) AD-703 517

In this paper the author indicates the importance of improving the understanding of the process of change and summarizes some of the relevant literature on the innovation process in eduation. The role of a "change agent" and techniques for innovation in education and training are described.

"HumRRO Research on Project 100,000," by Howard H. McFann, paper for symposium at American Psychological Association convention, Washington, September 1969; issued as Professional Paper 37-69, 14 pp., December 1969. (Div. 3) AD-703 516

This paper presents the general research plans and some findings of HumRRO research associated with Project 100,000. The research objectives are to obtain information on what impact, if any, men taken into the Army under this program will have on training and operations, and to understand the relationship between measured aptitude and performance both in training and on the job. Summary data show the general relationship between Armed Forces Qualification Test scores and performance to include laboratory tasks and operational training. One of the conclusions is that efficient and effective training must take into account individual differences. Plans are presented which have the goal of providing necessary information on factors involved and techniques to account for them.

"Military Psychology and General Psychology," by Meredith P. Crawford, invited address to Division of Military Psychology, American Psychological Association meeting, Washington, September 1969; *American Psychologist*, vol. 25, no. 4, April 1970; issued as Professional Paper 16-70, 12 pp., May 1970. (Exec. Off.) AD-712 898

In this paper the relevance of military psychology to current social problems is discussed and illustrated. Relevance was considered from the point of view of the substance, the research and development methods, and the especial orientation to implementation of research findings that are associated with military psychology. Among the topics dealt with are the techniques of task and skill analysis and job definition and their relationship to research and development in education; precise derivation of objectives in educational technology; and cross-cultural interaction.

HumRRO Research and the Army's Training Programs, by Saul Lavisky, Professional Paper 36-69, 21 pp., December 1969. (Exec. Off.) AD-701 607

This paper reviews, in a narrative form, conspicuous examples of Army utilization of HumRRO research-and-development products between 1951 and 1969. It describes some of the ways in which behavioral- and social-science research has helped to improve Army training.

"HumRRO, A Systems Approach," by Saul Lavisky, *Educational Screen and Audiovisual Guide*, vol. 49, no. 1, January 1970. (Exec. Off.)

HumRRO Research in Training Technology, presentations at Headquarters, U.S. Continental Army Command, Fort Monroe, Va., February 1970; issued as Professional Paper 21-70, 39 pp., June 1970. (Exec. Off.) AD-712 285

This paper records four presentations on research and development in educational technology made by members of the HumRRO staff at a briefing sponsored by the Office of the Deputy Chief of Staff for Individual Training at Headquarters, U.S. Continental Army Command in February 1970. The presentations describe research under Work Unit IMPACT, Prototypes of Computerized Training for Army Personnel; research activities on individual training, with low aptitude personnel under Project 100,000; and research in aviation training and aviation training devices. This was the sixth in a series of briefings on training research and development programs of the U.S. Army Behavior and Systems Research Laboratory, the Center for Research in Social Systems, and HumRRO.

"HumRRO and Training Technology: An Introduction," by Meredith P. Crawford, paper for CONARC briefing, Fort Monroe, Va., February 1970; included in *HumRRO Research in Training Technology*, Professional Paper 21-70, 39 pp., June 1970. (Exec. Off.) AD-712 285

This introduction to the CONARC briefing provides a background for the four papers presented, and outlines an approach to the development of training programs which form an important basis of a technology of training. The organization of HumRRO, particularly as it relates to the Army, is presented.

"Individual Training of Personnel of Different Aptitudes," by H.H. McFann and Arnold A. Heyl, paper for CONARC briefing, Fort Monroe, Va., February 1970; included in *HumRRO Research in Training Technology*, Professional Paper 21-70, 39 pp., June 1970. (Div. 3) AD-712 285

This paper is concerned with individual training in the combat and combat-support MOSs, in a population representing the complete spectrum from the functional illiterate to the college graduate. Research performed with low-aptitude personnel under Project 100,000 in HumRRO Work Units UTILITY, REALISTIC, APSTRAT, and SPECTRUM is discussed.

"Synthetic Flight Training Devices," by Wallace W. Prophet, paper for CONARC briefing, Fort Monroe, Va., February 1970; included in *HumRRO Research in Training Technology*, Professional Paper 21-70, 39 pp., June 1970. (Div. 6) AD-712 285

This paper is a progress report on HumRRO research in aviation training and aviation training devices.

"Solving People Problems," by Saul Lavisky, *Army Digest*, vol. 25, no. 3, March 1970, pp. 13-15. (Exec. Off.)

This article appeared in the *Army Digest* as a review of HumRRO's two decades of research for the Army. The six major areas of research were—individual training and performance; unit training and performance; training for leadership, command, and control; language and area training; training technology; and training management.

"A Manpower Delivery System: Implications for Curriculum Development," by Robert G. Smith, Jr., paper for Invitational Conference for Curriculum Development and Vocational Training, University of Minnesota, March 1970; issued as Professional Paper 19-70, 9 pp., June 1970. (Exec. Off.) AD-713 499

A simplified and abstract model of a manpower delivery system is presented in this paper. The relationships among the functions of occupational demands, guidance activities, placement work, occupational barriers, and interests of the job-seeker are discussed. The model points out to educational and training planners the principal aspects to consider when conducting a system analysis for vocational or professional education.

"Systematic Approaches for Identifying and Organizing Content for Training Programs," by Harry L. Ammerman, paper for Invitational Conference for Curriculum Development and Vocational Education, University of Minnesota, March 1970; issued as Professional Paper 20-70, 15 pp., June 1970. (Div. 5) AD-713 719

This paper concentrates on two aspects in the development of curriculums for technical training: (1) the identification of curriculum content for specific courses of study, and (2) the organization of such content in training programs. Use of a word-association technique in a military radar maintenance course revealed that many procedural questions need exploring before this approach can become an operational tool of curriculum designers, but its potential usefulness warrants further research. Effort being expended in making instructional decisions should be directed toward more rigorous and complete determination of the performance requirements.

"Motivation and Incentives in Manpower Analysis," by Eugene A. Cogan, Working Group presentation for 25th Annual meeting of Military Operations Research Society, U.S. Coast Guard Academy, New London, Conn., June 1970. (Exec. Off.)

This paper provides main findings from three selected studies on motivation and incentives in the Army, from which the author has drawn a number of simple generalizations. The results made clear that studies can play a significant role in national policy on military service and on policies about civilian occupations.

APPENDICES

Appendix A

FY 70 TECHNICAL REPORTS AND PROFESSIONAL PAPERS BY NUMBER[1]

Technical Reports

69-14 *The Effects of Changes in Transition Firing Upon "Quick Kill" Proficiency*, July 1969. (TAS)

69-15 *Military Advisors and Counterparts in Korea: 1. Job Characteristics*, August 1969 (For Official Use Only). (MAP II)

69-16 *A Taxonomy of Response Processes*, September 1969. (BR-8)

69-17 *Reinforcement Management: An Approach to Motivating Army Trainees*, November 1969. (BR-18)

69-18 *An Analysis of Skill Requirements for Operators of Amphibious Air Cushion Vehicles (ACVs)*, November 1969. (OVERDRIVE)

69-19 *A Review of Combat Support Training*, December 1969. (SPECTRUM I)

69-20 *The Effects of Interruption of Dark Adaptation on Performance of Two Military Tasks at Night*, December 1969. (NIGHTSIGHTS I)

69-21 *Planned Change in Agrarian Countries*, December 1969. (CIVIC II)

69-22 *Determination of Ground-to-Aircraft Distances by Visual Techniques*, December 1969. (SKYFIRE)

69-23 *Learning by Listening in Relation to Aptitude, Reading, and Rate-Controlled Speech*, December 1969. (REALISTIC)

69-24 *Squad Performance as a Function of the Distribution of a Squad Radio*, December 1969. (CONTROL)

69-25 *Development of a Procedure-Oriented Training Program for HAWK Radar Mechanics*, December 1969. (HAWKEYE I)

69-26 *Evaluation of the Integrated Contact-Instrument Concept for Army Fixed Wing Flight Instruction*, December 1969. (INTACT I)

69-102 *A Study of U.S. Coast Guard Aviator Training Requirements*, December 1969. (AVTRAIN) (Research for U.S. Coast Guard)

69-103 *Design and Procurement Bases for Coast Guard Aircraft Simulators*, December 1969. (AVTRAIN) (Research for U.S. Coast Guard)

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[1] Research for the Department of the Army unless otherwise noted.

70-2 *Methods of Training for the Engagement of Aircraft With Small Arms*, February 1970. (SKYFIRE)

70-3 *Theory and State of the Art of Small-Group Methods of Instruction*, March 1970. (INGROUP)

70-4 *Auditory and Visual Tracking of a Moving Target*, March 1970. (SKYFIRE)

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70-6 *A Determination of Selected Costs of Flight and Synthetic Flight Training*, April 1970. (ECHO III)

70-7 *Equipment-Device Task Commonality Analysis and Transfer of Training*, June 1970. (ECHO IV)

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70-9 *An Experimental Program of Instruction on the Management of Training*, June 1970. (TRAINMAN)

70-101 *Establishment of a Tumor Registry System for Louisiana: Proposals on Objectives, Capabilities, and Structure*, June 1970. (TUMOR REGISTRY SURVEY) (Research for Louisiana Regional Medical Program)

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25-69 *Progress Report on HumRRO Research on Project 100,000.*

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27-69 *The Development of Cultural Self-Awareness: Design of a Program of Instruction.* (COPE)

28-69 *Aptitude Level and Performance in Simple and Choice Visual Monitoring Tasks.* * (SPECTRUM)

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31-69 *Human Factors in Airmobility.*

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33-69 *Collected Papers Prepared Under Work Unit AAA: Factors Affecting Efficiency and Morale in Antiaircraft Artillery Batteries.* * (AAA)

34-69 *Combat Aviator Criterion Development.* (PREDICT)

35-69 *Operational Context Training in Individual Technical Skills.*

36-69 *HumRRO Research and the Army's Training Programs.*

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37-69 *HumRRO Research on Project 100,000.*

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